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| 10/563,144 | 09/14/2006 | **Hanxiang Shi** | 078199/000002 | 5887 |

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| EXAMINER | |
|---|---|
| LEUNG, JENNIFER A | |
| **ART UNIT** | **PAPER NUMBER** |
| 1774 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@tuckerellis.com

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/563,144 | SHI, HANXIANG | |
| | Examiner | Art Unit | |
| | JENNIFER A. LEUNG | 1774 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *22 June 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6 and 8-17* is/are rejected.

7)☒ Claim(s) *5 and 7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 22, 2010 has been entered.

### Status of Claims

2. Applicant's amendment filed on June 22, 2010 has been considered. Claims 8-17 are new. Claims 1-17 are under consideration.

### Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 4, 8-10 and 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Beretta et al. (EP 0 344 032).

Regarding claim 1, Beretta et al. discloses a reactor (see, e.g., the embodiment in FIG. 9B; Abstract) comprising: a reactor shell **R**; an axisymmetric body **4** disposed within the reactor shell and being axisymmetric relative to an axis (i.e., the vertical axis); and an annular axisymmetric body **3** disposed on an inside surface of the reactor shell **R** and being axisymmetric about the (vertical) axis; wherein the axisymmetric body **4** is formed by rotating a single curved

line without a straight line portion and comprised of at least two curved portions having different radii, as a generatrix, around the (vertical) axis (i.e., the upper portion of the curved line and the lower portion of the curved line each have different radii, see figure).

Regarding claim 2, Beretta et al. discloses that the reactor shell **R** is cylindrical with a smooth inner surface (see FIG. 9B).

Regarding claim 4, Beretta et al. discloses that a maximum diameter of the axisymmetric body **4** is not less than an inner diameter of the annular axisymmetric body **3** (see FIG. 9B).

Regarding claim 8, Beretta et al. discloses a reactor (see, e.g., the embodiments in FIGs. 9A, 9B; Abstract) comprising: a cylindrical reactor shell **R** having a smooth cylindrical inner surface; an annular body member **3** disposed on the inner surface of the cylindrical reactor shell; and a rotator body member **4** disposed within the cylindrical reactor shell **R** and being arranged coaxially relative to the annular body member **3** along an axis (i.e., the vertical axis); wherein the rotator body member **4** overlaps the annular body member **3** in a direction of the (vertical) axis, and wherein the rotator body member overlaps the smooth inner surface of the cylindrical reactor shell **R** in the direction of the (vertical) axis (see figures).

Regarding claim 9, the annular body member **3** and the rotator body member **4** are each axisymmetric relative to the vertical axis (see FIGs. 9A, 9B).

Regarding claim 10, Beretta et al. discloses that the axisymmetric rotator body member **4** (i.e., as shown in the embodiment of FIG. 9B) is formed by rotating a single curved line without a straight line portion and comprised of at least two curved portions having different radii, as a generatrix, around the axis (i.e., the upper portion of the curved line and the lower portion of the curved line each have different radii, see figure).

Regarding claim 13, Beretta et al. discloses a reactor (see, e.g., the embodiments in FIGs. 8, 9A, 9B, 9C; Abstract) comprising: a cylindrical reactor shell **R** having a smooth cylindrical inner surface; an annular body member **3** disposed on the inner surface of the cylindrical reactor shell and having an inner diameter; and a rotator body member **4** disposed within the cylindrical reactor shell **R** and being arranged coaxially relative to the annular body member **3** along an axis (i.e., the vertical axis); with a selected distance between the rotator body member **4** and the annular body member **3** capable of permitting a feedstock to pass through the reactor; wherein the rotator body member **4** overlaps the annular body member **3** in a direction of the (vertical) axis, and wherein the rotator body member **4** has an outer diameter that is greater than the inner diameter of the annular body member **3** see figures).

Regarding claim 14, the annular body member **3** and the rotator body member **4** are each axisymmetric relative to the vertical axis (see FIGs. 8, 9A, 9B, 9C).

Regarding claim 15, Beretta et al. discloses that the axisymmetric rotator body member **4** (i.e., as shown in the embodiment of FIG. 9B) is formed by rotating a single curved line without a straight line portion and comprised of at least two curved portions having different radii, as a generatrix, around the axis (i.e., the upper portion of the curved line and the lower portion of the curved line each have different radii, see figure).

Instant claims 1, 2, 4, 8-10 and 13-15 structurally read on the apparatus of Beretta et al.

4. Claims 8, 9, 12, 13, 14 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Ainscow et al. (US 5,800,791).

Regarding claim 8, Ainscow et al. discloses a reactor (see FIGs. 4 and 6) comprising: a cylindrical reactor shell **4** having a smooth cylindrical inner surface; an annular body member

(i.e., collar **3**) disposed on the inner surface of the cylindrical reactor shell; and a rotator body member (i.e., hat **2**) disposed within the cylindrical reactor shell and being arranged coaxially relative to the annular body member **3** along an axis (i.e., the vertical axis), wherein the rotator body member **2** overlaps the annular body member **3** in a direction of the (vertical) axis (i.e., the apex of a hat **2** overlaps with the lower edge of a collar **3** when the units are assembled); and wherein the rotator body member **2** overlaps the smooth inner surface of the cylindrical reactor shell **4** in the direction of the (vertical) axis (see figures).

Regarding claim 9, Ainscow et al. (see FIGs. 4 and 6) discloses that the annular body member **3** and the rotator body member **2** are each axisymmetric relative to the (vertical) axis.

Regarding claim 12, Ainscow et al. discloses that the axisymmetric annular body member 3 and the axisymmetric rotator body member **2** collectively form a rotary build-in member (see FIG. 4); and a plurality of the rotary built-in members are arranged relative to the cylindrical reactor shell along the (vertical) axis (see FIG. 6).

Regarding claim 13, Ainscow et al. discloses a reactor (see FIGs. 4 and 6) comprising: a cylindrical reactor shell **4** having a smooth cylindrical inner surface; an annular body member (i.e., collar **3**) disposed on the inner surface of the cylindrical reactor shell, the annular body member **3** having an inner diameter; and a rotator body member (i.e., hat **2**) disposed within the cylindrical reactor shell and being arranged coaxially relative to the annular body member **3** along an axis (i.e., the vertical axis), with a selected distance between the rotator body member **2** and the annular body member **3** being capable of permitting feedstock to pass through the reactor (e.g., see flow lines **98**, **99** in FIG. 6); wherein the rotator body **2** overlaps the annular body member **3** in a direction of the (vertical) axis (i.e., the apex of the hat **2** overlaps with the lower

edge of a collar **3** when the units are assembled); and the rotator body member **2** has an outer diameter that is greater than the inner diameter of the annular body member **3** (see FIG. 4).

Regarding claim 14, Ainscow et al. (see FIGs. 4 and 6) discloses that the annular body member **3** and the rotator body member **2** are each axisymmetric relative to the (vertical) axis.

Regarding claim 17, Ainscow et al. discloses that the axisymmetric annular body member 3 and the axisymmetric rotator body member **2** collectively form a rotary build-in member (see FIG. 4); and a plurality of the rotary built-in members are arranged relative to the cylindrical reactor shell along the (vertical) axis (see FIG. 6).

Instant claims 8, 9, 12, 13, 14 and 17 structurally read on the apparatus of Ainscow et al.

**Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 3, 11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al. (EP 0 344 032) in view of Mathy (US 2,535,944).

Regarding claim 3, Beretta et al. further discloses that the annular axisymmetric body **3** (see FIG. 9B) is formed by rotating a straight line (i.e., which defines the portion of the body touching the cylindrical wall **R**) and a curved line (i.e., which defines the inner portion of the body), as a generatrix, around the (vertical) axis, wherein the straight line is parallel to the (vertical) axis, and the two ends of the curved line are connected with the two ends of the straight line, respectively, and the straight line and the curved line are within the same plane; a distance

between the straight line and the rotation axis is longer than a distance between the curved line and the rotation axis; and the axisymmetric body **4** is mounted relative to the annular axisymmetric body **3**, and is formed by rotating the single curved line around the axis, the two ends of the single curved line being connected with two spaced points on the axis, respectively, and the single curved line and the axis being within the same plane; and the axisymmetric body **4** and the annular axisymmetric body **3** being coaxial.

The apparatus of Beretta et al. is the same as the claimed apparatus, except that Beretta et al. fails to disclose that the curved line of the annular body **3** excludes straight lines. In FIG. 9B, the lower surface of the annular body **3** is defined by a curved line portion, but it appears that the upper surface of the annular body **3** is defined by a straight line portion. Mathy, however, teaches a reactor comprising an annular axisymmetric body (i.e., annular constricting element **4**; FIG. 1) formed by rotating a straight line (i.e., which defines the portion of the body facing the reactor wall) and a curved line (i.e., which defines the inner portion of the body), as a generatrix, around the vertical axis. In particular, the curved line is without a straight line portion (i.e., both the upper and lower surfaces are streamlined, with smooth and regular divergent or convergent curvatures; see column 3, lines 16-25). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the curved line forming the annular axisymmetric body **3** in the apparatus of Beretta et al. to exclude straight lines, because such would provide a more uniform flow and an intimate mixing of the phases, as taught by Mathy (e.g., column 3, lines 15-49).

Regarding claims 11 and 16, Beretta et al. further discloses that the axisymmetric annular body member **3** (see FIG. 9B) is formed by rotating a straight line (i.e., which defines the portion

of the body touching the cylindrical wall **R**) and a curved line (i.e., which defines the inner portion of the body), as a generatrix, around the (vertical) axis, wherein the straight line is parallel with the (vertical) axis and the two ends of the curved line are connected with the two terminal ends of the straight line, respectively.

The apparatus of Beretta et al. is the same as the claimed apparatus, except that Beretta et al. fails to disclose that the curved line of the annular body member **3** being without a straight line portion. In FIG. 9B, the lower surface of the annular body member **3** is defined by a curved line portion but the upper surface of the annular body member **3** is defined by a straight line portion. Mathy, however, teaches a reactor comprising an annular axisymmetric body (i.e., annular constricting element **4**; FIG. 1) formed by rotating a straight line (i.e., which defines the portion of the body facing the reactor wall) and a curved line (i.e., which defines the inner portion of the body), as a generatrix, around the vertical axis. In particular, the curved line is without a straight line portion (i.e., both the upper and lower surfaces are streamlined, with smooth and regular divergent or convergent curvatures; see column 3, lines 16-25). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the curved line forming the annular axisymmetric body **3** in the apparatus of Beretta et al. to be without a straight line portion, because such would provide a more uniform flow and an intimate mixing of the phases, as taught by Mathy (e.g., column 3, lines 15-49).

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al. (EP 0 344 032).

The reactor shell **R**, axisymmetric body **4**, and annular axisymmetric body **3** in the apparatus of Beretta et al. define separate, discrete elements. Thus, the reactor shell **R**,

axisymmetric body **4**, and annular axisymmetric body **3** would be manufactured separately. Although Beretta et al. does not specifically state that the elements are "installed as desired by welding, riveting, screwing or bolting", the examiner takes Official Notice that welding, riveting, screwing or bolting would have been recognized as well known connecting techniques in the art.

**Response to Arguments**

7. Applicant's arguments filed on June 22, 2010 have been considered but they are moot in view of the new grounds of rejection, necessitated by the amendment to claim 1 and the introduction of new claims 8-17.

The previous rejections under 35 U.S.C. 102(b) or 103(a) in view of the prior art to Broughton (US 3,523,762) or Bodnaras (US 5,741,466) have been overcome in view of the newly added feature of an axisymmetric body being formed by rotating "a single curved line without a straight line portion and comprised of at least two curved portions having different radii, as a generatrix, around the axis."

The examiner, however, asserts that this feature is disclosed by the newly discovered prior art to Beretta et al. In particular, the axisymmetric body **4** shown in FIG. 9B is formed by rotating a single curved line without a straight line portion and comprised of at least two curved portions having different radii, as a generatrix, around the axis (i.e., the curve defining the upper surface of the body **4** differs from the curve defining the lower surface of the body **4**, as can be determined by folding the image along line X-X').

**Allowable Subject Matter**

8. Claims 5 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim

and any intervening claims.

The prior art does not disclose or adequately suggest the claimed multi-phase reactor comprising several units mounted in the reactor from the top to the bottom, wherein, in particular, each unit comprises an axisymmetric body, an annular axisymmetric body, and a reactor shell integrated together to form said unit; and the axisymmetric body is formed by rotating a single curved line without a straight line portion, as a generatrix, around an axis; said single curved line being comprised of at least two curved portions having different radii.

The closest prior art to Beretta et al. discloses a reactor comprising many of the claimed features, including an axisymmetric body **4** formed by rotating a single curved line without a straight line portion and with two curved portions of different radii, as a generatrix, around an axis (see the embodiment shown in FIG. 9B). Beretta et al., however, fails to disclose or adequately suggest a reactor being formed by several units mounted in the reactor from the top to the bottom, wherein each unit comprises an axisymmetric body, an annular axisymmetric body, and a reactor shell integrated together to form said unit

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. LEUNG whose telephone number is (571)272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter D. Griffin can be reached on (571) 272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JENNIFER A LEUNG/
Primary Examiner, Art Unit 1774